County of San Diego

PHYSICIANS' BULLETIN

Health and Human Services Agency ◆ P.O. Box 85222, San Diego, CA ◆ 92186-5222 www.co.san-diego.ca.us/cnty/cntydepts/health

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WEST NILE VIRUS AND OTHER MOSQUITO BORNE ENCEPHALITIDES

Saint Louis Encephalitis (SLE) and Western Equine Encephalitis (WEE) were considered the two main mosquito-borne virus agents of encephalitis in California. In 2003 West Nile Virus (WNV) was found in humans, mosquitoes, birds and other animals in Southern California. While no locally acquired human cases of WNV were documented in 2003 in San Diego County, one horse and five wild birds were positive for the virus. When seeing patients with neurologic involvement and recent history of exposure to mosquitoes consider WNV and other mosquito borne encephalitides. Because the rapid westerly spread of WNV resulted in a high number of human cases across the United States, West Nile Virus is highlighted in this publication.

WEST NILE VIRUS AND OTHER MOSQUITO BORNE ENCEPHALITIDES. West Nile Virus is a mosquito borne flavivirus. Mosquitoes become infected when they feed on infected birds. Subsequently, infected mosquitoes can transmit the virus to humans and other animals. The incubation period in humans is usually three days to two weeks. Most people who are infected with the West Nile Virus will have no symptoms. About 20% of those who become infected will develop a mild febrile illness (West Nile fever), which signs and symptoms include fever, headache, and body aches, occasionally with a skin rash on the trunk of the body and swollen lymph glands. Severe infection (West Nile encephalitis or meningitis) may present with headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, convulsions, muscle weakness, and paralysis. It is estimated that 1 in 150 persons infected with the West Nile Virus will develop a more severe form of disease. Mild disease will generally resolve in three to six days. Symptoms of severe disease may last several weeks; in some, neurological effects may be permanent. Residents and visitors in areas in which WNV activity has been identified are at risk. Persons older than 50 years are at greater risk of severe disease.

There is currently no specific treatment for WNV, but supportive care is important for severe illness. More severe cases often require hospitalization. While there currently is no vaccine against WNV for humans, several companies are working towards developing a vaccine. The most sensitive screening tests for WNV are the IgM-capture enzyme linked immunosorbent assay (ELISA) and the IgM Indirect Fluorescent Antibody (IFA) for serum. Testing for West Nile Virus is available through the San Diego County Public Health Laboratory. Although PCR testing for WNV is insufficiently sensitive, this test may be available for other mosquito borne encephalitis viruses. Because WNV infection resembles many other cases of encephalitis, it is important to consider other etiologies as well as West Nile.

Suspect cases must be reported to the county health department before referring for testing. Testing is recommended on individuals with encephalitis, aseptic meningitis ($\geq$ 18 years old), acute flaccid paralysis / Atypical Guillain-Barré / transverse myelitis of unknown etiology, and aseptic meningitis in individuals < 18 years old after negative workup for enteroviruses. Specimens required include Acute Serum: $\geq$ 2cc serum collected $\leq$ 7 days after onset; Cerebral Spinal Fluid: 1-2cc CSF, if lumbar puncture is performed; and if West Nile is highly suspected and acute serum is negative a convalescent (2nd) Serum: $\geq$ 2cc serum collected 3-5 days after the acute serum. Testing is also recommended on individuals who are seen by a health care provider for a febrile illness compatible with West Nile fever, lasting at least 7 days; a single serum specimen should be collected at the time of visit for West Nile Virus IgM testing. Each specimen should be labeled with date of collection, specimen type, and patient name. Specimens should be sent on cold pack by courier to the San Diego County Public Health Laboratory, 3851 Rosecrans Street, San Diego, California 92110. On weekends refrigerate specimens and send to the Public Health Laboratory on Monday. Please do not send specimens on Friday. Specimens must be accompanied by a completed West Nile Case History Form and Public Health Laboratory Specimen Submission Form (included in this bulletin).

- LABORATORY -

The San Diego County Health & Human Services Agency's Public Health Laboratory offers testing for selected vector-borne diseases. For information and specific instructions on collection and submission of appropriate specimens, call the Public Health Laboratory at (619) 692-8500.

- REPORTING -

Health care providers are urged to promptly notify the County Community Epidemiology Division of any reportable communicable and noncommunicable disease & condition at (619) 515-6620, M-F 8:00 AM to 5:00 PM; (858) 565-5255, Evenings & Weekends; FAX (619) 515-6644

When seeing patients with recent history of exposure to arthropods, rodents and other vertebrates of public health significance, particularly patients with travel history to endemic areas in and outside the united states, consider the following vector borne diseases in your evaluation.

MALARIA. Malaria in humans is caused by *Plasmodium falciparum, P. vivax, P. ovale* and *P. malariae*. Competent anophelene vector mosquitoes are relatively common in San Diego County, and locally acquired cases of malaria have occurred in this county during the mid to late 1980's. A history of mosquito bites should be reviewed in patients presenting with symptoms compatible with malaria, which include shaking chills, high fever, sweats, and headache. Because of the cyclic nature of this disease, persons with mild symptoms should return when symptoms intensify and the parasite, which is not evident in the blood during mild symptoms, is once again present. If malaria is suspected, a thick and thin smear of peripheral blood should be obtained and examined for the presence of malaria parasites. The blood should be collected prior to therapy. Optimal results are obtained with blood collected during spikes of fever and with smears prepared from freshly collected uncoagulated blood. Positive or suspect positive smears and the blood (in purple top tubes with EDTA anticoagulant) should be delivered or sent to the Public Health Laboratory.

PLAGUE: Plague, which is caused by *Yersinia pestis*, has been documented in San Diego County in wild animals, primarily ground squirrels. Patients should be asked about possible exposures to fleas and/or their wild animal hosts, particularly in rural and mountainous areas if symptoms are consistent for plague. The most common presentation in humans is lymphadenitis in nodes of the inguinal (90%), axillary or cervical area. The involved nodes are swollen and tender and may suppurate. Fever is often present. All forms of this bubonic plague, including those without lymphadenopathy, may progress to septicemic plague disseminating to various parts of the body. Secondary lung involvement may lead to pneumonia, possibly with mediastinitis or pleural effusion. Plague pneumonia may lead to person to person [or animal to person] transmission of respiratory droplets resulting in primary pneumonic or pharyngeal plague.

TULAREMIA: Also known as "rabbit fever", tularemia is caused by the gram-negative coccobacillus *Francisella tularensis*. The disease manifests varyingly according to route of exposure and host response, but characteristically presents as an acute febrile illness. Most often patients present with an ulcer at the site of introduction, accompanied by swelling of regional lymph nodes, pharyngitis, ocular lesions, and pneumonia. Human infections typically involve an arthropod bite (commonly ticks and deer flies) or unprotected handling of sick or dead animals, particularly rabbits, squirrels, voles, mice and rats. Less commonly, tularemia has been contracted by eating or drinking contaminated food or water, inhaling dust from contaminated soil or handling contaminated animal pelts.

LYME DISEASE. *Borrelia burgdorferi*, the causative spirochete of Lyme Disease, has been found in the Western Black Legged tick, *Ixodes pacificus,* which is fairly common in San Diego County. Locally acquired Lyme Disease cases have also been reported in this county. Initial symptoms of Lyme Disease may include skin lesion/rash, frequently, but not always, annular (erythema migrans - EM), accompanied by flu-like symptoms, fever and muscle aches. Some individuals exhibit swollen lymph glands. Most persons treated with appropriate antibiotics at this stage will have a quick recovery. Lack of treatment of Lyme Disease may result in long-term complications including disorders of the heart or nervous system, and arthritis. Because serological tests are not standardized, and their sensitivity is unclear, the patient should be treated based on clinical observations.

ROCKY MOUNTAIN SPOTTED FEVER. Rocky Mountain Spotted Fever, which is caused by *Rickettsia rickettsii*, is characterized by a sudden moderate to high fever, nausea, vomiting, severe headache, muscle pain, joint pain, chills, conjunctival injection, lack of appetite, abdominal pain, diarrhea, and a maculopapular rash (35% to 60% of patients) which appears on the extremities at first, including the palms and soles (50% to 80% of patients with rash), and rapidly spreading to much of the body. RMSF is transmitted by the Rocky Mountain wood tick, *Dermacentor andersoni*, in the western region of the US, and the American dog tick, *D. variabilis*, in the eastern region. Both tick vectors also serve as reservoirs, maintaining the pathogen in nature through transovarial and transtadial transmission.

HANTAVIRUS: Wild rodents are the primary reservoirs for hantavirus. Infected rodents shed virus in their saliva, urine and feces. Infection primarily occurs when dried or fresh materials contaminated by rodent saliva or excreta are disturbed and inhaled as aerosols or are directly introduced into broken skin. Infection has also occurred through the bite of an infected rodent. Initial symptoms are similar to less severe viral infections, with most cases experiencing fever, myalgia and chills. Other symptoms include dyspnea, nonproductive cough, headache, nausea, vomiting, diarrhea and malaise. The illness progresses rapidly to severe respiratory failure and shock. The mortality rate is approximately 40%-50%. Testing for antibody to the viral agent that causes hantavirus pulmonary syndrome (HPS) can be done by the State Viral and Rickettsial Disease Laboratory (VRDL). An acute blood (5-10 ml in a red/gray top tube) and a case report questionnaire should be submitted to the Public Health Laboratory, which will forward the specimen to the State. A convalescent serum should be collected 10 to 14 days after onset as well.

RABIES. This fatal acute viral encephalomyelitis is transmitted through virus-laden saliva of rabid animals. Initial symptoms are nonspecific and include onset of apprehension, headache, fever, malaise and sensory changes. The disease progresses with neurological symptoms, which may include insomnia, anxiety, confusion, slight or partial paralysis, excitation, hallucination, agitation, hypersalivation, difficulty swallowing, and hydrophobia. Death usually occurs within days of the onset of symptoms. Human rabies can be prevented by eliminating exposure to rabid animals and administration of appropriate pre-exposure and post-exposure prophylaxis to those at risk. The diagnosis of rabies should be considered seriously in cases of encephalitis where the patient has lived in or recently visited an area where rabies is enzootic, even in the absence of a significant exposure history.

RABIES PROPHYLAXIS. Because rabies is invariably fatal, post exposure prophylaxis (PEP) should be administered immediately whenever a patient is bitten, scratched or has other exposure, such as open wound, abrasion or mucous membrane contact with the saliva or nervous system tissue of a high risk animal. PEP should be administered immediately whenever a domesticated animal, such as a dog, cat or ferret, is not available for rabies testing or follow-up observation, regardless of the animal's vaccination status. If the animal is wild (non-domesticated), such as a bat, skunk, raccoon, fox, coyote, bobcat or other wild mammal, and it is not available for rabies testing, PEP should also be administered immediately. PEP should be seriously considered if a patient was asleep in a room where a bat is found dead or alive, and the animal is not available for rabies testing. PEP is not indicated if a patient is bitten, scratched or otherwise exposed to a low risk animal, such as a mouse, rat, squirrel, guinea pig or hamster.

The Physicians' Bulletin is published on an as needed basis by the County of San Diego Health and Human Services Agency to provide updated information on health issues of concern to San Diego County's medical community.

DIAGNOSTIC TESTING GUIDELINES FOR WEST NILE VIRUS

WNV testing is recommended on individuals with the following:

A. ***Encephalitis***

B. ***Aseptic meningitis (individuals ≥ 18 years of age)***

C. ***Acute Flaccid Paralysis/Atypical Guillain-Barré Syndrome/Transverse Myelitis***

D. ***Febrile illness*:***
- Illness compatible with West Nile fever and lasting ≥ 7 days
- Must be seen by a health care provider.

The West Nile fever syndrome can be variable and often includes headache and fever (T≥38°C). Other symptoms include rash, swollen lymph nodes, eye pain, nausea or vomiting. After initial symptoms, the patient may experience several days of fatigue and lethargy.

E. ***Aseptic Meningitis (individuals < 18 years of age)*:***
- After workup for enteroviruses (e.g. CSF PCR, throat or stool isolation)

** Identification of human cases is important early in the West Nile virus season to assess the burden of human illness and will be important to target mosquito control and public education activities to reduce exposure risk. Depending on the volume of tests requested and laboratory capacity, the local public health department may discontinue testing of individuals that fall into category (D) and (E) once West Nile virus is well-established in the area.*

Instructions for Sending Specimens

1. Required
   - **Acute Serum** - ≥ 2cc serum collected ≤ 7 days after onset
   - **Cerebral Spinal Fluid** – 1-2cc CSF *if lumbar puncture is performed*
2. If West Nile is highly suspected and acute serum is negative
   - **2nd Serum** - ≥ 2 cc serum collected 3-5 days after the acute serum

- Each specimen should be labeled with **date of collection**, **specimen type**, and **patient name**
- Specimens should be sent on **cold pack** using an overnight courier
- A completed **West Nile Case History** and **this form** must accompany the specimens
- Please do not send specimens on Friday
- Send to Local Public Health Laboratory:

San Diego County Public Health Laboratory
3851 Rosecrans St.
San Diego, CA 92110

Patient's last name, first name				Route to: [ ] SERO [ ] ISOL [ ] FA [ ] _____ [ ] _____ [ ] _____ [ ] _____
Age or DOB:	Sex (circle): M F	Onset Date:		
Disease suspected or test requested: **West Nile Virus**			**This section for Laboratory use only.**	
1st	Specimen type and/or specimen source	Date Collected	1st	
2nd	Specimen type and/or specimen source	Date Collected	2nd	
3rd	Specimen type and/or specimen source	Date Collected	3rd	

Questions? Please call Jill Giesick or Let Negado (619) 692-8500

04-2004

West Nile Case History Form

This **case history form** is required for testing (specimens will not be tested without this form). Please notify **Community Epidemiology (619) 515-6620** before submitting specimens to the Public Health laboratory. Specimens submitted via public health laboratories must meet the criteria for West Nile virus testing. (See" Requirements for West Nile Virus Testing")

Patient Information:

Last name _____ First name_____DOB ____/_____/____ Medical Record #_____

Street Address: _____City _____Zip Code _____Occupation_____
Phone Number _____

Physician Information Mandatory

Name: _____ Facility: _____

Phone # or Pager: _____ Fax: _____ Email: _____

Race: o White o Black o Native American
o Asian/Pacific Islander o Other o Unknown

Date of 1st symptom(s): ____/____/____
o Hospitalized **or** o ER /Outpatient
Date of admit: ____/____/____

Do the following apply anytime during current illness:

In ICU	o No	o Yes
Fever ≥38º	o No	o Yes
Headache	o No	o Yes
Rash	o No	o Yes
Stiff neck	o No	o Yes
Muscle Weakness	o No	o Yes
Altered Consciousness	o No	o Yes
Encephalitis	o No	o Yes
Aseptic Meningitis	o No	o Yes
Flaccid Paralysis Asymmetrical	o No	o Yes o

CSF results

Date: _____
RBC: _____
WBC: _____
%Diff: _____
Protein: _____
Glucose _____

CBC results

Date: _____
WBC: _____
%Diff: _____
HCT: _____
Plt: _____

Other Information (MRI/CT,LFTs etc.)

_____

_____

Ethnicity: o Hispanic o Non-hispanic
Sex: o Female o Male

Exposures within 4 wks of onset (specify details):

Mosquito bites/exposure: o No o Yes

Outdoor activity (camping, hiking, etc) o No o Yes

Received Blood Transfusion: o No o Yes
Date:

Travel within 4 wks of onset

(**specify location**, **dates**):

Within California (out of local area) o No o Yes

Within the United States? o No o Yes

Outside of the United States? o No o Yes

Ever traveled outside the US? o No o Yes

Other pertinent information:

Immunocompromised patient: o No o Yes

Yellow fever vaccination: o No o Yes
Date:

Military service: o No o Yes

Current Pregnancy o No o Yes
Week of gestation:

Donated Blood: o No o Yes
Date:

Significant Past History (medical, social, family) and other exposures:_____

_____

_____

_____

For questions regarding testing of specimens, please contact Jill Giesick or Let Negado (619) 692-8500

Fax this form to **(619) 692-8558** and send with specimens to:
San Diego County Public Health Laboratory
3851 Rosecrans St., San Diego, CA 92110